

Introduction to Photography

Topic 11 - Bits & Bytes

Learning Outcomes

You will have a much better understanding of the basic units of digital photography.

Bits & Bytes

A Bit is the basic unit on a computer, which can be 0/1, off/ on.

A Byte is 8 Bits, eight 0s/1s.

A Byte has 8 slots for 2 units: So think of 1 Byte as 2 to the 8th power, can represent 256 distinct values.

That is why we have Kilo, Mega and Giga to refer to much larger file sizes.

- Kilo- 1024 Bytes
- Mega- 1024 Kilobytes
- Giga- 1024 Megabytes

Bits are for interface speed and Bytes are for internet storage. Generally speaking, B denotes Bytes and b represents bits.

We use these fundamental values to represent digital photography. Photos are made of millions of tiny pixels that are represented as 0s and 1s.

Red, Green & Blue (RGB)

We consider colour to be separated into three constituent parts: red, green and blue. Every pixel that you see also has these three parts - red, green and blue. Each red, green and blue value is made up of 8 Bits. These combined make up a JPEG format.

Another format you will see is 16 Bit TIFF – Useful for photographers when we want to get the most quality out of our photographs. Without complicating it too much, this is essentially just a higher Bit rate.



Introduction to Photography

24 Bit colour means that every pixel has 24 Bits of colour information. In its simplest form, an image is a table of pixels each of which has 24 Bits of information. This is a lot of information so we need to find a way to compress the picture for our computers and so that we can email clients/ friends an image that they can use and manipulate it should they wish to do so.

There are various methods of compression.

Problem: Very few photos have uniform sections of colour.

Graphics Interchange Format (GIF) uses this approach.

This works well for the German and French flags because we have distinguished lines that separate uniform sections of colour.

JPEGS compress things slightly differently in that it breaks the photo apart into blocks and simplifies each block.

Extreme JPEG compression can create big ugly blobs, that look uniform (within themselves) but not to the adjacent blocks. This is a lossy compression format and it will look very bad because data is being thrown away that is “not important”.

JPEG

Red	Green	Blue
8-bit	8-bit	8-bit

Keep JPEG photos (original files) safe when editing. Always use “SAVE AS” to keep files separate.



Introduction to Photography

Raw Files

A camera raw image file contains minimally processed data from the image sensor of a digital camera, image scanner, or motion picture film scanner.

More and more people are shooting RAW. RAW files do not lose quality but they are very heavy because they have not been processed.

Raw files are useful if you want to use image processing software, which may perform additional work to improve image quality.

Image Formats

Name	Compression	Color	Alpha
JPG	Lossy	24-bit	No
GIF	Lossless	8-bit*	Yes
PNG	Lossless	24-bit	Yes**
PSD	Unknown (lossless)	48-bit	Yes
TIFF	Lossless	48-bit	No

* GIF contains an 8-bit palette (or subset of colors) from a 24-bit set of colors

** Some software does not properly display transparency in PNG files

JPG is the most common file format that you will come across in terms of compression. You're going to hear me talk about them a lot throughout this course.

GIF files, as we've seen, are very basic subsets of colour that lack the colour information of higher bit rate files.

PNG are another common file type and they are very useful if you want to display transparency in your file. They are useful if you're working with photographs in Photoshop, which leads me into the next file type.

PSD - These files are recognised as Photoshop working files.

TIFF files, again, are useful if we want that higher bit rate in our work.



Introduction to Photography

Each pixel typically consists of 8 bits (1 byte) for a Black and White (B&W) image or 24 bits (3 bytes) for a color image-- one byte each for Red, Green, and Blue. 8 bits represents $2^8 = 256$ tonal levels (0-255). Therefore, the bits and bytes are important, they refer to the detail of the pictures you will be capturing in a digital format.



Introduction to Photography

What have we learned today? A Summary

Today we have learned about the fundamental values used digital photography.

Remember that a Bit is the basic unit on a computer, which can be 0/1.

We've also learned about how colour is made up of three parts: red, green and blue.

